assumed as a basis of method, but in his preface M. Moissan says :—

"Nous apportons, sur ce sujet, des idées éclectiques, et la raison, éclairée par l'expérience, sera toujours notre seul guide."

The geological and mineralogical sources of substances are considered, but the details of physical and analytical chemistry are not touched. Industrial operations are sometimes chosen to illustrate chemical change, and, where thought desirable, the prices and tables of production of different countries are introduced. The work is primarily intended for those engaged in research, in industry, and in teaching. Among the thirty-two contributors may be mentioned the names of Charpy, Étard, Le Chatelier, Lemoine, Sabatier, and Vogt, besides many others of good reputation.

The introduction by the editor gives a historical sketch of the classification of the elements. In the present state of our knowledge of elementary bodies it is interesting to meet with the unprejudiced words of Lavoisier :—

"If, by the word element, we mean the simple and indivisible molecules of which bodies are composed, it is probable that we do not know them; but if, on the other hand, we apply the name element or principle to the last term at which chemical analysis arrives, all substances which have not hitherto been decomposed are for us elements."

The bearing of spectrum analysis on the question of the unity of matter is briefly touched on, and Moissan says that in his own high temperature work no sign of transmutation has ever been observed. He inclines, however, to the supposition of the unity of matter, and in alluding to the recent work connected with radio-activity, he believes that "we are witnessing the dawn of inorganic chemistry, a subject not long ago regarded as exhausted."

Various attempts at classification are next considered, but not even the periodic table is adopted. The reviewer cannot agree that the method followed presents any advantage whatever. The first family comprises hydrogen and helium, and the reason given for this curious collocation of elements is that helium is not well known! Carbon is separated from silicon, because the latter element forms no large number of "organic" compounds, and because the halides of silicon, like those of titanium and zirconium, are decomposed by water. While in most groups the element of lowest atomic weight is discussed first, cæsium begins the metals of the alkali group, because of its chemical activity; for the same reason the nitrogen group should begin with phosphorus. The final statement that the author thought it better to group the elements in accordance with their known properties rather than to give them to the reader in the disorder of alphabetical order seems hardly a happy way of determining which method of classification is the best, seeing that no particular properties are chosen, the criterion of resemblance sometimes being the appearance of the element, sometimes its melting-point, sometimes the stability of its salts in presence of water, and sometimes none of these, as where cobalt is placed in the same group as uranium, and lead and tin are separated from each other.

The result is, that without an index, which has not yet appeared in any one of the published parts, it is an almost hopeless task to find any desired compound. Gmelin's plan, perhaps, may serve as guide, that is, to find out the elements which have been treated of already, and to take the last in the formula of the compound as an index. But this leads to such an anomaly as having to look up bismuth thiocarbonate under "carbon," while potassium thiocarbonate comes under the heading "potassium." The amido-derivatives, too, are to be found after the salts from which they are prepared, and do not form a group by themselves, similar as they all are to each other.

Subject to these criticisms, however, the work is very complete, and is a most valuable compilation. It is unfortunately not free from omissions; for example, in discussing the determinations of the density of hydrogen, the work of Lord Rayleigh has been overlooked. Again, it is stated on the authority of Lunge (1879) that the greatest amount of chlorine in the world is made at the St. Rollox Works in Glasgow, a statement which is now unfortunately inaccurate. The spelling of proper names, also, leaves room for correction; Brareton-Baker, Tadeusz Estreicher, and Stass are among those which have caught the reviewer's eye. But, as before remarked, the index of literature is very large, and the number of facts given is greater than what is ordinarily to be found in a text-book, while the information is generally up to date, and these are advantages which cannot be overlooked.

ELECTRIC TRAMS.

Electric Traction. By J. H. Rider. Pp. xvi+453. (London: Whittaker and Co., 1903.)

THE name of the author and his position as chief electrical engineer to the London County Council Tramways are sufficient to recommend this book to anyone interested in electric traction. Nor do we think that anyone who takes it up in the hope of gleaning some useful or suggestive information is likely to put it down with the slightest feeling of disappointment. The style is terse, but eminently readable; the opinions expressed by the author are often, no doubt, open to argument, but they have the great merit of conveying the impression that they are the opinions of a man who knows practically all that there is to be known about his subject, and who does not hesitate to state his own convictions, whether they are likely to be in agreement with those of other people or not. For example, we may refer to the little outburst of evident irritation at the need for the objectionable but compulsory guard-wires. These, the author holds, "do not strike at the root of the matter, which is to prohibit entirely uninsulated wires of any kind crossing above the trolley wires." Here speaks not the expert, but the tramway engineer; perhaps if fate had destined Mr. Rider to be a telegraph engineer, we

should have been told that the only thing to do was to prohibit entirely uninsulated wires of any kind from crossing below the telegraph wires. Why should the telegraph wire be banished underground rather than the overhead equipment changed to the conduit system which Mr. Rider has shown us can be so efficient? We fancy the objection which would be made to the change by either party would be the same—that they would prefer the other side to make it and to pay for it.

The ancient recipe for cooking a hare applies with particular force to the design of a system of electric tramways; the motto of the tramway engineer should always be "First catch your passenger." One cannot read this, or, indeed, any comprehensive book on electric traction, without being strongly impressed by the degree to which the whole of the engineering depends ultimately on the halfpenny passenger. The engineer builds a bridge, dams a river or constructs a railway from the Cape to Cairo, and the work is a piece of engineering almost pure and simple, but he may design and equip a first class traction system—generating station, engines, dynamos, cables, track, line and cars—and if he is out of his reckoning as to the time the housewife goes to market all his energy has been wasted. It is she who determines the kind of car and the kind of service, and, these once settled, everything else follows almost as a matter of course. It is here really that electric tramways and electric traction score so heavily; they have the flexibility which enables them to be designed to meet and to satisfy the requirements of the public in a way which cannot be done by the omnibus on the one hand or by the steam railway on the other. The fact that electric traction came into being when these other means of transport were in strong possession of the field has been to its own advantage; it has had to cater for the requirements of the public in a way to attract them from its rivals, and the success with which it has done so is shown by the reaction on the railways, which are one by one resorting to electrification as their only salvation.

Electric tramway and railway development in England has been for a long time retarded from various causes, but of late years it has been making steady progress. Though much has already been done, there is still a vast amount to do. Our large cities all afford transit problems which it is safe to say no other method of traction yet known can solve so satisfactorily, and when these, as socially the more pressing, have been tackled, the question of light railway construction between town and town still offers great fields for development. We have not here the opportunities which the Americans possess but we have problems of our own at once more difficult and more urgent of solution. London in particular is a case in point, and there can be no doubt that once the Royal Commission now sitting has reported electric traction schemes for London will be plentiful. The electrical engineer who decides to go in for traction work is certain before long of great opportunities; he cannot better prepare himself for taking advantage of those opportunities than by reading Mr. Rider's book.

MAURICE SOLOMON.

OUR BOOKSHELF.

Milk, its Production and Uses. With Chapters on Dairy Farming, the Diseases of Cattle, and on the Hygiene and Control of Supplies. By Edward F. Willoughby, M.D. (Lond.), D.P.H. (Lond. and Camb.). Pp. xii+259. (London: Charles Griffin and Co., Ltd., 1903.) Price 6*s.* net.

ALL medical men and hygienists must necessarily know something about milk and its production, and this work, in a comparatively small compass, deals very fully and adequately with the whole subject. The author, being scientific adviser to one of the largest of the London dairy companies, has had practical experience in all branches of the subject, and his views, therefore, are worthy of confidence. The first four chapters are devoted to a consideration of the various breeds of cows, the qualities of the milk they produce, and their housing, feeding, breeding, and diseases.

In the fifth chapter the legal aspects of diseases of cattle are discussed, and a useful summary of the "Diseases of Animals Acts" and of the "Dairies, Cowsheds and Milk Shops Orders" is given.

The important subjects of the elimination of tubercle and the inspection and control of cowsheds are briefly treated. The physiology and dietetics of milk, pasteurisation and sterilisation, condensed, skimmed, and separated milks, therapeutics of milk, koumiss and other milk preparations, and diseases conveyed by milk, all receive brief attention.

The book concludes with chapters on the dairy, on milk analysis, on control of adulteration, with an abstract of the Foods and Drugs Act, and on the bacteriological examination of milk. The whole work is eminently practical and readable. As regards the conveyance of scarlatina by milk, the well known Hendon outbreak is detailed, but no reference is made to Prof. Crookshank's researches, which throw considerable doubt on some of the conclusions arrived at by the officials of the Local Government Board. The author considers that the alleged tendency to scurvy or scurvy rickets in infants brought up on sterilised milk is not proven, and with this we agree. It is stated (p. 142) that Nuttall and Thierfelder failed to rear young rabbits and fowls brought into the world under aseptic conditions so that their intestinal tracts were free from bacteria. This is not the case; Nuttall and Thierfelder found that guinea-pigs (not rabbits) so reared were even more vigorous than animals reared under ordinary conditions.

The book will prove a useful work of reference, especially for medical officers of health, and the numerous excellent illustrations add considerably to its value.

R. T. HEWLETT.

A Treatise on the Principles and Practice of Dock Engineering. By Brysson Cunningham, Assoc.M.Inst.C.E. Pp. xviii + 559. (London: Charles Griffin and Co., Ltd., 1904.) Price 30*s.* net.

THE author of this book is on the engineering staff of the Mersey Docks and Harbour Board, which has control over the largest and most efficient system of docks in the world. During the last few years, under the direction of Mr. Lyster, the engineer-in-chief, these docks have been modernised and brought up to date. New deep-water basins and repairing docks have been built; the entrances and sills of some of the old docks have been lowered. Transit sheds and cranes of modern type have been erected, so that these docks are now able to deal with the largest class of vessels yet built, and to load and unload the largest